

Lesson Plan 2

Title:	Lesson 2: Exploring the Elements of Stewardship
Target Grade Levels:	Grades 11-12
Time Allotted:	1–2 class periods
Instructor:	
Method of Instruction:	Lecture, group discussion, individual learning, Web-based learning

Instructional Goal

Upon completion of the unit, the student will be able to describe stewardship activities and issues relating to the Department of Energy's activities on the Oak Ridge Reservation.

Lesson Objectives

- ☐ Discuss the essential attributes of stewardship
- ☐ Discuss the basic elements of an effective stewardship program
- ☐ Research stewardship-related information systems on the Web

Materials & Resources

- ☐ Glossary

Visual Aids

- ☐ Course Overhead Transparencies—Lesson Plan 2

Handouts

None

Vocabulary (refer to Glossary for definitions)

- | | |
|--|--|
| <input type="checkbox"/> Authority and funding | <input type="checkbox"/> Maintenance |
| <input type="checkbox"/> Brownfield | <input type="checkbox"/> Monitoring |
| <input type="checkbox"/> Engineered barriers | <input type="checkbox"/> Notice of contamination |
| <input type="checkbox"/> Enforcement | <input type="checkbox"/> Operations |
| <input type="checkbox"/> GIS (geographic information system) | <input type="checkbox"/> Physical controls |
| <input type="checkbox"/> Governmental control | <input type="checkbox"/> Proprietary control |
| <input type="checkbox"/> Greenfield | <input type="checkbox"/> Public participation |
| <input type="checkbox"/> Information systems | <input type="checkbox"/> Research |
| <input type="checkbox"/> In situ vitrification | <input type="checkbox"/> Stewards |
| <input type="checkbox"/> Inspection | <input type="checkbox"/> Surveillance |
| <input type="checkbox"/> Institutional controls | |



Section	Instruction	Visual Aids
1.0	<p><u>Course Goal</u></p> <p><i>Review course goal:</i></p> <p>Upon completion of the unit, the student will be able to describe stewardship activities and issues relating to the Department of Energy's activities on the Oak Ridge Reservation.</p>	OVERHEAD 1: Stewardship on the Oak Ridge Reservation
2.0	<p><u>Lesson 2 Objectives</u></p> <p><i>Review objectives:</i></p> <ul style="list-style-type: none">• Discuss the essential attributes of stewardship• Discuss the basic elements of an effective stewardship program• Research stewardship-related information systems on the Web	OVERHEAD 2: Lesson Objectives
3.0	<p><u>The Essential Attributes of Stewardship</u></p> <p><i>Discuss the essential attributes of stewardship.</i></p> <ul style="list-style-type: none">• Responsibility• Long-term effectiveness• Adaptability <p>Responsibility means that our nation, the states, and our local communities must accept and share responsibility for providing a healthy and safe environment now and in the future.</p> <p>Long-term effectiveness means that stewardship programs must be designed to perform their functions for the lifetime of the contaminants—no matter how long that may be. To be effective, funding and the legal basis for stewardship must be stable over time.</p> <p>Adaptability means that stewardship programs must be able to adapt to changes in the physical, political, technological, and socio-economic conditions of our ever-changing world.</p>	OVERHEAD 3: Essential attributes of stewardship

Section	Instruction	Visual Aids
4.0	<p><u>The Seven Basic Elements of an Effective Stewardship Program</u></p> <p><i>Review the elements of stewardship by engaging students in a brief discussion of each element. For more information on the elements, reference either the “Oak Ridge Reservation Stakeholder Report on Stewardship, Vol. 1” (on CD) or the printed copy of the “Student Summary of the Oak Ridge Reservation Stakeholder Report on Stewardship.”</i></p> <p>A stewardship program must be organized around seven basic elements to be effective. Each element is related to the other elements. The relationships and links among the stewardship elements determine the effectiveness of the program. Adequate funding, well-defined roles and responsibilities, and proper tools for stewardship will ensure long-term protection of human health and the environment. The seven elements are:</p> <ol style="list-style-type: none"> 1. Authority and funding 2. Stewards 3. Operations 4. Institutional controls 5. Physical controls 6. Information systems 7. Research 	OVERHEAD 4: The seven basic elements of an effective stewardship program
4.1	<p><u>Authority and Funding</u></p> <p>Stewardship requires that clearly stated authority and funding elements are established at the program’s beginning. Under the current system, the Department of Energy has the financial responsibility to fund stewardship. Since Department of Energy funding is subject to annual Congressional appropriations, more stable funding sources are needed so that stewardship funding remains assured from year to year and is not subject to the political process.</p>	
4.2	<p><u>Stewards</u></p> <p>Stewards are those individuals or groups responsible for stewardship activities. There are three types of stewards:</p> <ul style="list-style-type: none"> • The Principal Steward has the legal responsibility for 	OVERHEAD 5: List of stewards

Section	Instruction	Visual Aids
	<p>contaminated land and facilities.</p> <ul style="list-style-type: none"> Regulatory Stewards ensure that the goals and requirements of the stewardship program are met. For the Oak Ridge Reservation, the Regulatory Stewards are the Environmental Protection Agency and the Tennessee Department of Environment and Conservation. Community Stewards comprise a variety of organizations that will provide public input to stewardship. These include public schools, libraries, local organizations and governments, and groups of concerned citizens. 	
4.3	<p><u>Operations</u></p> <p>Stewardship operations must include activities needed to ensure the integrity of environmental cleanup, the protection of human health and the environment, the distribution of information, and public education. Additionally, these operations include:</p> <ul style="list-style-type: none"> Monitoring Surveillance Maintenance Enforcement Inspection and re-evaluation Public participation <p><u>Monitoring.</u> Regular sampling of all contaminated and potentially contaminated areas is needed to identify possible failure of physical controls and to provide continuous understanding of the nature and extent of contamination.</p> <p><u>Surveillance.</u> Regular oversight of cleanup sites and remediation systems (such as burial ground caps and groundwater pumping stations) is required to determine if appropriate site conditions are being maintained.</p> <p><u>Maintenance.</u> Regular upkeep of cleanup systems is necessary to ensure long-term effectiveness.</p> <p><u>Enforcement.</u> Legal implementation of stewardship operations is required to maintain the protection of human health and the environment.</p> <p><u>Inspection and reevaluation.</u> Periodic review of existing systems is necessary to ensure their continued need and/or effectiveness.</p>	OVERHEAD 6: List of operations

Section	Instruction	Visual Aids
	<p><u>Public participation</u>. Continuous involvement of the public is required to ensure that citizens' concerns are addressed and that information is distributed.</p>	
4.4	<p><u>Physical Controls</u></p> <p>Physical controls are barriers that limit public access to hazardous contaminants. Examples are:</p> <ul style="list-style-type: none"> • Barriers to entry (fencing, natural barriers such as trees and shrubs, or uncontaminated buffer zones) • Engineered barriers (exposure to contaminated groundwater or surface water is limited by providing alternative water supplies, or treating groundwater, etc.) 	OVERHEAD 7: barriers
4.5	<p><u>Institutional Controls</u></p> <p>Institutional controls are legally binding controls that are designed to limit future use of land by restricting or controlling the type of development. The two types of institutional controls are governmental and proprietary.</p> <p><u>Governmental control</u> is the authority of federal, state, and local laws to impose and enforce restrictions on individuals and areas due to residual contamination.</p> <p><u>Proprietary control</u> is the authority of property owners to control the access and use of their property, for example through easements or advisories.</p> <p>Institutional controls are often applied to industrial sites, such as "greenfields" and "brownfields."</p> <p>Greenfields lack residual contamination and are available for any use of the land: residential, agricultural, or industrial. A good example of a greenfield site is the Horizon Center on Oak Ridge Turnpike in west Oak Ridge.</p> <p>Brownfields are areas of environmentally distressed property—land areas with residual contamination from an industrial facility or process. Brownfields are often thought to be unusable or undesirable for future use. However, land use controls can be implemented to limit environmental and health risks. The Department of Energy, for example, has programs in place to facilitate the reuse of some of its contaminated property, such as the Heritage Center, which is the former K-25 site on Highway 58.</p>	<p>OVERHEAD 8: Greenfield area - Oak Ridge's Horizon Center</p> <p>OVERHEAD 9: Brownfield area - Oak Ridge's Heritage Center</p>

Section	Instruction	Visual Aids
4.6	<p><u>Information Systems</u></p> <p><i>This element of stewardship is the subject of the web-based learning exercise in Section 5 of this lesson.</i></p> <p>Information systems are controls that provide present and future stakeholders with records of the locations, amounts, and characteristics of contamination.</p> <p>The Department of Energy is legally required to file Notices of Contamination with the County Register of Deeds. The counties' Register of Deeds geographic information system (GIS) is a convenient vehicle for long-term stewardship data retention. The appropriate notices and warnings can be electronically attached to property information within the computerized system of the Register of Deeds, Property Assessor, and the Tennessee State Parcel mapping system.</p>	
4.7	<p><u>Research</u></p> <p>Research is important because it can provide stewards with updated information about hazardous materials and how they are behaving over time. It can also show how well environmental cleanup measures are performing.</p> <p>Research into new technologies may provide previously unknown solutions to retrieving and treating some of the contamination left in place.</p> <p>One promising technology in development now is "in situ vitrification." In this process, high-voltage electrodes are inserted into a waste area, effectively melting the wastes and surrounding soil into a glass-like substance. Once cooled and solidified, the glass locks up the contaminants and renders them essentially harmless to the environment.</p>	OVERHEAD 10: In situ vitrification diagram
5.0	<p><u>Research Stewardship-Related Information Systems on the Web</u></p> <p><i>Lead an in-class search of web sites, or make this a homework assignment.</i></p> <p><i>The web site for Anderson County's Register of Deeds is www.andersondeeds.com. The web site for Oak Ridge City's Register of Deeds is http://gis.cortn.org. Each of these web sites has a search mechanism for searching by parcel number, property owner, etc. There is an excellent web page tutorial for the access and use of these two sites at http://home.comcast.net/~brooks50/ORR_LTS_Data_Retention_System.htm.</i></p>	

Section	Instruction	Visual Aids
6.0	<p><u>Lesson Summary</u></p> <p><i>Review objectives, and summarize what was learned in this lesson.</i></p>	<p>OVERHEAD 11: Lesson Objectives</p>